

TITLE: TECHNOLOGY TRANSFER FOR TOXIN DETECTION METHODS

MILESTONE SHC 1.2.5: Establish methods/protocols for routine ecological forecasts and develop scientific foundations for a broad spectrum of forecasts to reduce negative impacts of natural and human-induced events on ecosystems.

CCEHBR SCIENTISTS/INVESTIGATORS: Frances Van Dolah/Gregory Doucette (Co-PIs); Tod Leighfield

EXTERNAL COLLABORATORS: U.S. Food and Drug Administration; U.S. EPA, U.N. International Atomic Energy Agency, U.S. Army Medical Research Institute

OBJECTIVES OF RESEARCH ACTIVITIES: To validate the performance of high throughput receptor binding assays for algal toxins and to transfer the receptor assay technology to constituents who are responsible for monitoring algal toxin levels in fishery resources.

DESCRIPTION OF RESEARCH ACTIVITIES: The Marine Biotoxins Program has developed receptor assays for algal toxins in high throughput formats suitable for use in monitoring or regulatory applications. These assays have undergone extensive laboratory validation and are currently undergoing method comparison studies. In addition, the technology is being transferred to interested users, including regulatory laboratories seeking to replace live animal testing with reliable in vitro assays. Following technology transfer, interlaboratory calibration trials are conducted in order to rigorously test assay reproducibility.

Highlights from FY02:

- A multi-investigator method comparison study, led by US. FDA, was carried out this year on determination of brevetoxin in shellfish. For this study, the brevetoxin receptor assay was compared with cytotoxicity, ELISA, mass spectrometry (LC-MS), and the mouse bioassay, with the objective of assessing the suitability of these in vitro methods for replacing the mouse bioassay for regulatory purposes. Both the receptor assay and ELISA performed well in comparison with LC-MS and the mouse bioassay. An additional round of intercomparisons between these selected methods that is needed prior to their acceptance for regulatory application will be carried out in FY03 on multiple sample matrices.
- A method intercomparison between the mouse bioassay and the PSP receptor binding assay was carried out in collaboration with the California Department of Health Services in FY01. A follow-up study was initiated in FY02 to test matrix interference at low PSP levels that are believed to reflect protective effects of shellfish matrix to the mouse. This study is anticipated to pave the way for consideration of the receptor assay method for regulatory purposes.
- Contributed to a U.N. IAEA formulation meeting to develop an IAEA coastal zone management thematic plan. An initial project for the CZM thematic plan will entail coordination of an AOAC collaborative trial of the PSP receptor assay.
- Technology transfer projects for algal toxin detection were initiated in Africa (Angola, Namibia, S. Africa) and S. America (Chile) this year. Both projects will entail providing on-

site workshop training and fellowship training on in vitro assays for algal toxins at CCEHBR during FY03.



Dr. Elvira Sombrito, lead chemist for the IAEA-sponsored Technical Cooperation Project at the Philippines Nuclear Research Institute, visits the Marine Biotoxins Program to observe in vitro assays for algal toxins.



An estimated 5 million white mussels washed onto beach at Elands Bay, S. Africa, following an *Alexandrium catenella* bloom (photo by D. Horstman).

Publications/Reports:

Van Dolah, F.M. Assessment of IAEA Technical Cooperation Project "Nuclear Solutions to Address Specific Red Tide Concerns": A Report to the IAEA in support of the Thematic Planning Meeting on Coastal Zone Management Issues, Monaco, November 5-9, 2001.

Presentations:

Van Dolah, F.M. Experiences in the IAEA Technical Cooperation Project "Nuclear Solutions to Address Specific Red Tide Concerns". Report to an IAEA project formulation meeting for Africa Region, Vienna, Austria, April 15-19, 2002.

Doucette, G.J. Harmful "Harmful Algal Bloom issues in the Benguela Current region of southern Africa." Report to an IAEA project formulation meeting for Africa Region, Vienna, Austria, April 15-19, 2002.

Van Dolah, F.M. "Marine algal toxins: origins, health effects, and their increased global occurrence." Workshop on "An integrated approach to nuclear, non-nuclear and biological techniques for the detection of marine toxins," Santiago, Chile, June 17-21, 2002.

Van Dolah, F.M. "Application of the receptor binding assays for the detection of algal toxins in Southeast Asia." Workshop on "An integrated approach to nuclear, non-nuclear and biological techniques for the detection of marine toxins," Santiago, Chile, June 17-21, 2002.

Education/Outreach:

Yinglin Zou, First Institute of Oceanography, Xingdao, China, trained at CCEHBR on the PSP receptor binding assay under a UN IAEA Fellowship as part of the IAEA Technical Cooperation Project in Red Tides in SE Asia.

Awards: This program received the 2002 NOAA Technology Transfer Award.

